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PROCEEDINGS

OF

THE AMERICAN MICROSCOPICAL SOCIETY.

MINUTES OF THE SIXTEENTH ANNUAL MEETING.

Held at Madison, Wis., August 14th, 15th, and 16th, 1893.

MONDAY, *August 14, 1893.*

The members present assembled in Science Hall, University of Wisconsin, and at 10.30 a. m. were called to order by the President, Hon. Jacob D. Cox, of Cincinnati, Ohio, who made a short address on the conditions of our meeting this year, and stated that the attractions of the Columbian Exposition had probably proven so strong as to prevent the attendance of some of our members, but he expressed a hope that we would not allow this to diminish our pleasure at meeting together.

The Secretary reported the action of the Executive Committee in arranging to fill out sets of Proceedings in certain libraries where partial sets were already owned and in sending some sets to certain libraries in Europe.

The President explained the reasons for the action of the Executive Committee in trying to place the Proceedings within the reach of students.

The Treasurer reported the number of sets on hand and the number which had been sold in the past few years.

On motion of Professor Gage, the action of the Executive Committee in the distribution of the Proceedings was approved.

The local committee announced a boat ride for to-morrow evening, and also the location of rooms for the use of the visiting scientists in the building, and for the President's address in the evening at the Capitol.

The election of new members then took place, for whose names see circular last published and list of members at the end of this volume.

Professor Claypole reported some progress for the Committee on Universal Screw. The English makers used their taps till the wear made them inaccurate. No positive information had been obtained respecting the action of the German engineers.

President Cox: The American-made screw is larger than the English, so that the English objectives can be used on American instruments, but not *vice versa.* His English stands he had reamed out or had adapters made for them.

Mr. Mellor moved that the report of the committee be accepted, and that they be continued, and it was so ordered.

Professor Gage stated that the work of making sections and mounting them, which he had laid out for this afternoon, would, he thought, be uninteresting to those present, as most of them were well acquainted with that kind of work, and he thought it would be much better to allow Prof. W. S. Miller to occupy the time of the working session with an account of his work in preparing models of histological subjects on a large scale by reconstruction and corrosion methods—especially corrosion methods.

Dr. Ward moved that Dr. Miller be requested to occupy the afternoon session, and it was so ordered.

Professor Gage suggested that we consider the publication of the Proceedings.

The Secretary recommended the publication of abstracts, as explained in the last circular.

The President described the Royal Microscopical Society's journal. The question with us is, Will our journal be permanent? Can we keep it going five, ten, or any number of years?

Professor Claypole said the interest of the Proceedings was increased by its being published in parts, but that great practical difficulties lay in the way of publishing abstracts that would require familiarity with all the languages of Europe, and it would be difficult to find any one to do the work. If the summary were confined to this side of the water the difficulty would be far less, and it would be very useful. The demand for a knowledge of our forms of life in Europe is very great, and our proceedings will be valued just in proportion as we turn our attention to our own biology. We should not use our funds too closely, but, if possible, it would be a good thing to publish papers separately. Discussions are valuable if brief and to the point.

Professor Gage stated that it would be impossible to cover the world, but that this country might be attempted. The abstractors must be competent men, and when translations are to be made they must know both the subject and the language. Have we a sufficient number of competent persons to do such work? After five years I go to the original paper; the abstracts are only for a day. If too much of the energy of the Society were not put into it, it would be a good thing. We ought to work out our peculiar forms, which the Dutch, Germans, and French would be delighted to get. We have this glorious field and we ought to work it. Very much appears in the medical journals to which such abstracts should call attention. If we have money enough and can find the proper persons, let us do it; but we do not want to tax ourselves.

Dr. R. H. Ward: Let the number of parts be left to the Secretary. Ever since this discussion began I have been rather conservative in regard to it. It practically makes one more journal, and few men have the taste, time, and discretion to play the editor. If delegated to a committee it falls on a few men, who soon become tired of it, unless there is an experienced head.

Dr. R. H. Ward moved that the publication of abstracts be left to the discretion of the Executive Committee.

A part of the report of the Treasurer was read in answer to a question.

The President: There appears to be sufficient money to publish four numbers.

Dr. R. H. Ward: Would it not be better to spend more money on illustrations? Would not investigators think more of it if well illustrated? Make it more like the Quarterly Journal of Microscopical Science than the Journal of the Royal Society.

Mr. Pflaum offered a resolution to publish abstracts.

Dr. A. Schneider objected to abstracts by officers because they may deteriorate in successive changes.

Professor Rowlee doubted if an excess of illustrations was justifiable; the abstracts were worth more.

Professor Claypole thought a list of titles only would involve less labor for the Secretary, and less expense, and might be useful.

President Cox said that centers of research were now represented in this Society by young men capable of doing work both interesting and profitable, and that the work might become permanent by having a succession of workers that would carry it on.

Dr. Mercer suggested it might be desirable to endeavor to attract subscriptions beyond the membership.

Professor Gage: The work must be done voluntarily, not paid for. We do not want to stint our illustrations, but if $60 will do it I should be in favor of it; but I should not want to spend $150.

Dr. R. H. Ward's resolution empowering the Secretary to publish abstracts under the direction of the Executive Committee was then adopted.

At 12.20 the meeting then adjourned.

MONDAY AFTERNOON—2.30 o'clock.

The Society assembled to listen to Professor Miller's talk on reconstruction of histological preparations, illustrated by the preparations themselves. A summary of his remarks is here presented:

In the study of so complicated a problem as that of the relation which the blood-vessels and bronchi bear to each other and to one another in the lung, a considerable number of methods must be made use of. I shall endeavor to present to you those from which I obtained the best results during a lengthy study of the subject.

BLOWING UP AND DRYING.—This method is especially applicable to the lungs of the lower animals. Remove the lungs, with the trachea, taking care not to puncture them; cut off any shreds of connective tissue, tie a canula into the trachea and connect by means of rubber tubing with an air-blast or, in case the pressure is sufficient, with the gas supply. In twelve to twenty-four hours they will be dry, and on cutting open will present fine views of the air-spaces. If the blood-vessels are injected with some fluid holding colored pigments in suspension (Pausch's starch mass is good) previous to blowing up, the relation which they bear to the air-spaces is easily made out. This method is not applicable to the lungs of the higher animals.

WAX CORROSIONS.—This is of especial value in the study of the lungs of the higher animals. Inject the various sets of vessels with different-colored wax and corrode in hydrochloric acid. If the lung is suspended in a large glass vessel and the air exhausted, putting the lung in the condition of forced inspiration at the time the wax is injected, the result will be more satisfactory. The wax mass must not be too hot, nor the pressure used too great.

WOOD'S METAL.—Use samples that have a melting point of 72° C. Have plenty of hot water and make the injection quickly. Corrode in a saturated solution of caustic potash. Do not keep the corrosions in a hot room.

CELLOIDIN INJECTIONS.—These are by far the most satisfactory. Inject the different sets of vessels with a moderately thick solution of celloidin which holds in suspension granules of vermilion, insoluble Prussian blue, or chrome yellow. Ultramarine blue should not be used. When the injection is complete allow the specimen to remain in the air from five to ten minutes, and then place in a large quantity of normal pepsin solution and keep in a thermostat regulated for 37.5° C. When the digestion of the tissues is complete, remove, wash thoroughly in water, and preserve in a mixture of equal parts alcohol, water, and glycerine. The pepsin prepared by Parke, Davis & Co. gave the best results.

DIRECT MODELING.—This is of use when we wish to bring out points which may be just seen with the unaided eye. An amplification of twenty to fifty is sufficient for this purpose. Wax, clay, or plaster of Paris may be used for the model. Many measurements and drawings of the object from all sides should be made. It requires much time and patience, but the results are always satisfactory.

RECONSTRUCTION FROM SERIAL SECTIONS.—For minute objects and for bringing out the finest structures, no method is to be compared with this. Born devised the method in 1883, and it has been used largely in embryology, but at the present time is being applied to histology. I cannot here enter into a detailed account of the method, but will refer the reader to the Journal of Morphology, vol. VIII, No. 1, "The Structure of the Lung," and to the Reference Handbook of the Medical Sciences, Supplement, "Anatomy of the Lungs," both articles being by Dr. Miller.

Especial emphasis was laid on the fact that one of the essential factors in such work is *patience* and *perseverance ;* without these nothing can be accomplished.

At the conclusion, Mr. Pflaum moved to have a soiree Wednesday evening.

Dr. Mercer moved the soiree be dispensed with, as no dealers were present.

The Secretary suggested the appointment of a director of the soiree and working session.

Professor Barnes, for the local committee, said such an officer was very desirable. The local committee had been unable to find out whether there would be any soiree or not and were in a state of uncertainty, which prevented their doing anything.

The Society decided to dispense with a soiree this year.

MONDAY EVENING.

The Society met in the Assembly Chamber of the Capitol at 8 o'clock and listened to addresses of welcome by Mayor Corscot, of Madison; General Lucius Fairchild, president of the local committee, and Prof. C. R. Adams, president of the University of Wisconsin.

Professor Cox briefly responded, and then delivered the annual address, which is herewith printed.

TUESDAY MORNING, *August 15.*

The Society met at about 10 o'clock, and the minutes of the previous meeting were read and approved.

The President appointed M. D. Ewell and Edward Bausch to audit the accounts of the Treasurer.

Upon open nomination, the following members were elected to act as nominating committee to present candidates for the offices for the ensuing year: William A. Rogers, W. H. Walmsley, Edward Bausch, R. H. Ward, and M. D. Ewell.

Several new members were then elected.*

President Cox explained yesterday's action, in response to a question, as regards the distribution of copies of our Proceedings.

Professor Claypole took exceptions to the word soiree, as applied to our exhibitions, stating that the word was most frequently applied to assemblies of a light and trifling character and usually included refreshments, etc., and moved that the word exhibition be used hereafter instead of the word soiree.

After some discussion, the motion prevailed.

Professor Claypole then read his paper on The Teeth of Palæozoic Fishes.

Professor Gage: Is the central structure analogous to dentine?

Professor Claypole: It occupies the place of dentine.

The Secretary asked if the demarcation is perfect.

Professor Claypole: In determining these questions weathered specimens are untrustworthy, and I cannot break a perfect specimen; they are too rare. Some time we may find a small piece that will be suitable to grind down.

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* By accident, the name of Dr. Robert Innis Bromley, of Sonora, Cal., was omitted from the list of new members in the circular.

Professor Cox suggested that a specimen could be cut in two and put together again.

Professor Claypole: That may be, but I have not yet found the right specimen.

Professor Rowlee: Have the mouth parts disappeared, or were they transmitted to later fossil or living forms?

Professor Claypole: Shear teeth have disappeared, and the fish that bore them are extinct. There are one or two representatives, unworthy descendants of their illustrious sires, more or less nearly allied to the Placoderms, but these iron-clads of nature's navy passed away before the trout, salmon, and other Teleosts came in. The mouth pieces are not often found, because they are loose and easily separated from the jaws, which remain.

After the reading of this paper Professor Gage presented a report on the award of prizes, as follows:

REPORT OF THE COMMITTEE ON PRIZES OFFERED FOR THE ENCOURAGEMENT OF MICROSCOPICAL RESEARCH.

The committee beg leave to present the following report:

The work offered for these prizes is of the highest character and fulfills all the requirements, and the committee is unanimous in awarding the following:

1. A first prize of $50 to Miss Edith J. Claypole, of Akron, Ohio, for an investigation in animal histology; subject, "The Blood of *Cryptobranchus* and *Necturus*."

2. A first prize of $50 to Mr. Hermann Schrenk, of New York city, for an investigation in vegetable histology; subject, "Parasitism of *Epiphegus Virginiana*."

3. A first prize of $30 to Dr. Wm. C. Krauss, of Buffalo, for six mounted slides illustrating a part of the central nervous system.

SIMON H. GAGE,
Chairman.

NOTE.—The committee consisted of Professors Gage, Kellicott, and Seaman, but as Professor Kellicott was not present, Dr. W. S. Miller was invited to act in his place.

After the meeting the Secretary was informed that the money for these prizes was contributed by the following gentlemen, citizens of Pittsburg, Pa.:

Joseph Albree.
A. W. Cadman.
Geo. H. Clapp.
Chas. J. Clarke.
Dr. D. H. De Puy.
H. C. Frick.
Rev. W. J. Holland.
John B. Jackson.
Hon. W. M. Kennedy.
Dr. A. Koenig.
John L. Lewis.
C. C. Mellor.
Magnus Pflamm.
W. J. Prentice.
John D. Shafer.
C. B. Shea.
Calvin Wells.

The report of the Committee on Prizes was adopted.*

Professor Rowlee then read his paper on "The Aërating Roots of *Mikania scandens.*"

Professor Lazenby: What is the structure of these aërial roots?

Professor Rowlee: There are no peculiarities of structure, such as stomata or lenticels, adaptations for aëration, which, I venture to say, the gentleman has in mind. The only structural modifications are the numerous air-containing spaces in the cortex of the root. The air passes into these spaces by diffusion.

The Secretary remarked that it was certain destruction to bury the roots of forest trees deeper than they had been accustomed to be, but that they might be brought nearer the surface without injury.

Professor Claypole: What is the nature of the roots of swamp trees? The river flooded my garden for three months, many bushes and trees were killed, but the apple, gooseberry, and currant survived. There seems to be a very unequal power of resistance. Is the nature of the air the same in the cells that it is outside?

Professor Rowlee: There is less oxygen in the air contained in the spaces than there is in the air surrounding the organ. There are two elements essential to plant growth—air and water—both of which must be present to enable a plant to live. Now, in my opinion, air is quite as essential to the roots of plants as it is to the aërial parts. Different species differ, no doubt, in the amount of air required. I hope during the coming year to submerge the roots of plants related to this one and see what will be the result.

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* For resolutions of thanks see page 32.

Professor Rowlee then presented an abstract of the essay by Mr. Schrenk, which received the award of a prize, "On the Parasitism of *Epiphegus*." This summer Mr. Schrenk found seedlings no larger than a pin-head attached to a beech root. The connection between the parasitic flowering plants and their host can only be made out by studying their germination. Mr. Schrenk's paper will be found in full in the Proceedings hereafter. The announcements for the afternoon excursion were then made and the meeting adjourned.

TUESDAY AFTERNOON—2 o'clock.

The Society assembled to listen to a description by Dr. Mercer of his apparatus for photomicrography, such as described in the last number of the Proceedings. For obtaining best results with achromatics the correction collar should have sufficient movement to correct the objective for a tube length of four or five feet, and the lens should be used without an ocular. Any lens used with an objective gives an inferior image, excepting in the case of an apochromatic.

Dr. Deck then explained the method of using his heliostat, figured in vol. XIII of Proceedings, page 49. The mirror should revolve once in 48 hours, opposite the course of the sun.

Professor Gage then spoke on apochromatic lenses, projecting eye-pieces, and photo lenses. The first difficulty was the difference between the chemical and the visual focus. This was partially overcome by the use of orthochromatic plates, but in the apochromatic lenses the optical and actinic foci coincided, and if one gets a good visual focus the picture will be sharp. He used a projection ocular; the apochromatics depended on the ocular, and if used without disappointment would result. They are not designed for photography without the projection ocular. The systems of the ocular are separated by turning the top of the ocular. After the microscope is roughly focussed, the top of the ocular is slightly moved by turning it till a sharp image of the diaphragm appears on the screen; unless the image of the diaphragm is sharp one does not get a good result. Then the focus is made as fine as possible by combining plane and ground glass, looking through plane, clear glass in the center, obtained by cementing a cover-glass on. By using a focusing glass in the way devised and advocated by Mr. Walmsley one can get good results, and the difficulties of photomicrography are much lessened. In addition, if one wishes to magnify a large object, say only 10 to 15 diameters, an ordinary photographic lens is excellent, as is illustrated by this section of a salamander head, showing the brain.

Professor Cox stated that he generally used a Huyghenian eyepiece, so as to have the same image on the plate that he saw with his eyes.

E. Bausch stated that he had done a great deal of work in testing lenses, and failed frequently to get the definition he should have in the negatives, owing to the fact that frequently cameras are not exact in the coincidence in the position of the plane surfaces of the ground glass and the sensitive plate. Holders differ, and sometimes the plates are warped.

Professor Cox said that he used a plane glass on which to focus and not a ground glass. I slide my plane glass into the same frame in which the plate goes; then I know my film is in the right place.

Dr. Mercer said Dr. Piffard uses a Spencer achromatic spherically corrected for yellow (sodium line) light and plates specially sensitive to the same light and but little sensitive to other light. Dr. Woodward used achromatics made by Wales and others spherically corrected for blue light and probably pretty closely the blue which makes the strongest impression on the retina when focusing with the ammonio-sulphate of copper solution used as a light filter. Wet plates, used by Dr. Woodward, are sensitive to blue and light of higher refrangibility. But the numerous pieces of glass the light passes through—in condensers and objectives, and the slip and cover-glass—filter out most of the rays of higher refrangibilito and leave the blue active.* Dr. Piffard's lens would give poor results with Dr. Woodward's plates, and Dr. Woodward's lenses would give poor results with Dr. Piffard's plates.

Mr. Walmsley exhibited one of his latest cameras, and said that he had designed several styles, and that this one would make negatives or positives, as, for instance, lantern slides or copies of engravings in the same camera. Modern objectives from one-quarter inch up do not need special correction for photography; the older ones did need correction. I have sometimes corrected by a spectacle lens or a double convex of ten-inch focus. The Harvard dry plates give me the best results. I use a compound developer of hydroquinone and eikonogen; have discarded pyro and all the rest. The correct time of exposure is necessary. Stained preparations, even double-stained, can be taken successfully. I use a little bromide, and prefer to always start development with a developer that has been used.

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* E. M. Nelson : Journal R. M, S., February, 1893, p. 15.

A large number of photographs of sections of leaves of the Coniferæ from slides prepared by Professor King and photographed by Mr. Walmsley were shown.

WEDNESDAY, *August 16, 1893.*

The Society met at 10 o'clock a. m., and approved the minutes of the preceding meeting.

The report of the Treasurer was read; also the certificate of the auditors that it was correct. The report was approved and is printed herewith.

The Committee on Nominations presented the following names of members to fill the offices for the ensuing year:

For President—Lester Curtis, M. D., Chicago, Ill.

For Vice-Presidents—Prof. W. W. Rowlee, Ithaca, N. Y.; Prof. W. S. Miller, Madison, Wis.

For Secretary—Dr. William H. Seaman, Washington, D. C.

For Treasurer—Charles C. Mellor, Pittsburg, Pa.

For members of the Executive Committee—Dr. Lyman Deck, Salamanca, N. Y.; Dr. V. A. Moore, Washington, D. C.; Prof. T. D. Biscoe, Marietta, Ohio.

Dr. Ewell moved that the Secretary be instructed to cast the ballot of the Society for the names proposed. The Society adopted the motion, and, the Secretary having cast the ballot, the officers were declared elected for the next year.

President Cox then requested Miss Edith J. Claypole to come forward and presented to her the prize of fifty dollars awarded for her paper, at the same time expressing the pleasure it gave him to perform that duty. He stated that while Professor Claypole had given his chief strength to geology, he and his wife had found time to show much interest in other departments of scientific investigation. Their daughters had grown up, as it were, in our own scientific family, and were examples of inherited love for science and power to do good scientific work. As an alumnus of Oberlin, which claims to be the first college that ventured upon the co-education of the sexes, he looked back, he said, upon the names of young women who have become famous, and of some who, if not famous, have maintained through long lives their intellectual character, such as the mother of Prof. Frederic Allen, of Harvard, with whom any man might feel proud to claim comradeship in intellectual work.

Miss Claypole then presented an abstract of a portion of her paper on the blood of *Necturus*, touching the relations of the ingestion of carbon by leucocytes. The paper itself is herewith published.

Professor Ewell then showed a steel bar plated with iridium, and described it as follows:

Metal bars for metric purposes should fulfill several requirements, among which durability under ordinary conditions of use is perhaps one of the most important. The bar herewith presented is four inches long and one inch square, and was plated with iridium by Mr. John Holland, of Cincinnati, Ohio. As you see, it takes a good polish and a good line under the ruling diamond.

The ordinary chemical reagents have no effect whatever upon it, and the plating is so hard as to withstand usage that would ruin a standard made from any other metal with which I am acquainted, unless it be solid platinum iridium. All things considered, such a surface as this, unless one is prepared to incur the large expense of a solid platinum-iridium bar, seems the best attainable in the present state of our knowledge.

Dr. Ewell then read his paper on A Metric Study of 2,000 Check Signatures. In the McDonald will case at Indianapolis the length of a man's signature was an important point. I examined 1,000 of my own signatures and thought I should find some law governing this question, but I was doomed to disappointment. It was shown that the signatures of one of the subscribing witnesses and of Senator McDonald to the alleged will and duplicate were identical; hence they were respectively copies of some one signature.

As to the spectroscopic examination of ink, I have obtained every kind of ink in the country to make an exhaustive examination of them, but I have completed the red inks only. No court will allow you to destroy the document; hence the microspectroscope becomes a very valuable instrument, because of the small quantity of material required. I use a microspectroscope by Zeiss and a patent spectroscope by Schmidt and Haensch. I have also used Schmidt and Haensch's large spectrometer. The manufacturer has many names for the same ink; the red inks are mostly eosine.

Professor Gage asked if the light shining through the paper could not be used.

Professor Ewell: The spectrum of the ink on the paper is the same as that of the solution, but it is not entirely satisfactory. A fraction of a grain will give a spectrum with the microspectroscope.

Professor Cox: I feel it necessary for me to say that I am very skeptical as to expert testimony in relation to forgeries. My own signature varies according to varying conditions.

Dr. L. Curtis: When a boy my mother had to sign many papers and checks, and after a severe illness her signature had changed so that they refused to recognize it at her bank.

Dr. Ewell thought Professor Cox too sweeping in refusing all expert evidence as to handwriting. There are a certain class of signatures which carry with them intrinsic evidence of fraud. The experts made a copy of the will in the McDonald case, and on cross-examination the false copy was substituted for the true one and a bank cashier swore positively it was the true one. A comparison of handwriting where you have sufficient material leads to a degree of probability that is almost certainty.

The Secretary cited the case referred to by Judge Ira Harris, of Albany, in which a comparatively uneducated farmer identified his own signatures without hesitation when interposed with a large number of forgeries.

Professor Gage then read his paper on the Structure of Muscles of the Lamprey.

President Cox called the attention of the Society to some new photographs of diatoms, which he exhibited, and which were made by Mr. T. F. Smith, F R. M. S., of London, England. The photographs illustrate the points in diatom structure which were discussed by Mr. Smith and himself in papers published in the Journal of the New York Microscopical Society for April, 1891. They seem to demonstrate the existence in *Pleurosigma formosum* of a wavy diagonal fibrillar structure, overlying and inclosing the alveoli. Mr. Smith has found that by the use of isochromatic plates in photography he has been able to improve greatly on the presentation of these details, and the prints are exhibited, primarily, as evidences of this improvement.

Mr. Cox took occasion to add that he thought Mr. Smith had been fortunate in happening upon specimens of diatoms in a peculiar state of partial disintegration, the silex having been lacking to such an extent as to repeat in the natural specimen some of the results Professor Bailey long ago aimed to produce artificially by the use of hydrofluoric acid. The silex being removed or being lacking, the vegetable fiber is exposed.

The very interesting examples photographed do not prove that other species would show identical fibrillar structure, though we might expect an analogous one. Thus in *Pleurosigma balticum* we might expect longitudinal or transverse fibrils in place of these diagonal ones. It is well worth while to be watchful for other specimens in a similar state. Imperfectly silicified forms are not uncommon, some species being unfit to mount by means of the usual preparation in acids and by fire, for this reason. He had found in the Richmond deposit a *Mastogloia* so delicate and so slightly silicified that the examples are nearly always crumpled and folded on themselves, so that their examination is attended with no little difficulty. Prof. Hamilton Smith mounted some gatherings of West India forms which were in a similar state, and were bent and distorted in curious shapes, instead of being broken into glassy fragments as diatoms usually are when force is applied. Some Sandwich Island forms have been mounted in a similar condition.

He called the attention of members to these facts, as indicating a direction in which may be found opportunities for investigation of the vegetable fiber underlying the silex of diatoms, and for determining how the fibers are combined in different genera and species to make the basis for the valve, which ordinarily gives so purely a mineral appearance and fracture. He was also sure that the beautiful prints would be admired as capital specimens of high-power photography.

Prof. Pierre A. Fish then presented a paper on a new clearer for collodion, being commercial oil of thyme three parts, castor oil one part. Professor Gage remarked he had observed its working, and its merits were not overestimated.

President Cox requested the members not to neglect registration of their attendance in the book provided therefor.

Resolutions of thanks were then offered by Professor Gage to the

University of Wisconsin for the excellent accommodations furnished to the Society, and by Dr. Curtis to the Committee of Arrangements and citizens of Madison for the care and pains they had taken to provide for the comfort and pleasure of the members of the Society.

Professor Gage returned thanks to the members of the Society for the assistance rendered him in carrying out the idea of the working session at an outlay of much time and expense in bringing apparatus.

President Cox addressed the Society on the great pleasure he received from meeting with them, even if unable to be present at every annual session, and assured the members that time will only ripen their attachment for and earnest personal interest in each other as well as their devotion to science.

The President then resigned the chair to Dr. Curtis, who expressed his reluctance to take the place of so able a presiding officer.

The Secretary gave a brief notice of the death of Rev. Mr. Wolle, and on motion of Dr. Ewell the Society then adjourned.

WEDNESDAY AFTERNOON, *August 16, 1893.*

The Society assembled at two o'clock to listen to Prof. Wm. A. Rogers on a description of the methods of making micrometric measurements. In micrometers the lines should be capable of being rubbed with a soft linen handkerchief in the direction of the lines, without interfering with the sharpness of definition of the edges. The divisions of the filar micrometer and of the stage micrometer should be of the same size, and not over $\frac{1}{10000}$ of an inch wide. With a filar micrometer eye-piece low powers generally give better results relatively than high ones. Professor Morley and myself made a series of measurements of the same spaces on different days and found the errors from four to five times as great as on the same day.

Dr. Ewell said he had much less confidence now than he had formerly.

Professor Rogers: I feel sure that I can now measure within the limit of one micron with as much ease and certainty as to three microns a few years ago, and the chief improvement has come through a better determination of the real focal distance of the lines.

Professor Gage: When you measure blood corpuscles where do you begin and where do you stop? Where is the edge?

Dr. Ewell: Moses C. White, of Yale College, made some disks of glass and put them into different media; the extreme edge was the point to measure from.

Professor Rogers: I would first underfocus, then overfocus on the line, and then take the mean of the two results.

President Cox had an eye-piece micrometer made of a cover-glass by Professor Rogers that fitted on the diaphragm of a Beck ocular, D series, and by unscrewing the eye-piece slightly he could get a sharp focus on the lines, and count the spaces on the eye-pieec and compare with the stage micrometer at the same time.

Dr. Ewell: I differ from Professor Rogers. I have no difficulty in getting the edge of blood corpuscles as sharp as a knife-edge every time. I never had a power high enough to break down a metal line, and I cannot secure sharpness on blood corpuscles beyond 1,000 diameters.

Professor Gage: The human corpuscle is very thin and that of the lower animals is very thick. So with muscular fibers, and thick objects offer serious difficulties.

Professor Rogers: The limits in passing from real focus to bad focus are very narrow.

Dr. Ewell: In using the Abbe apertometer the lens must be stopped down to measure the useful aperture.

Dr. Deck: This method overrates the value of the objective.

Dr. Ewell: Different objectives differ much in value. All rays admitted should be image-forming rays.

Mr. E. Bausch: The old method of rating aperture by the admission of light has ceased to be valuable.

President Cox: Tolles took a diatom slide and by means of a swinging arm measured the image he got.

Dr. Ewell: I have a large disk graduated to half degrees; it is not any better.

President Cox: I used Professor Smith's apparatus by changing the microscope into a telescope. I lay a paper on the mirror and swing the mirror back and forth.

Professor Gage: The prizes we have awarded were given by Pittsburg people, and I move the following resolution:

1. *Resolved*, That the thanks of the American Microscopical Society are hereby tendered the people of Pittsburg for the means by which the Society was enabled to offer prizes for original work.

2. *Resolved*, **That the slides for which a prize was given be put into the custody of the Pittsburg Microscopical Society.**

These resolutions were seconded by Dr. Ewell and adopted by the Society.

Mr. Mellor returned thanks on behalf of the people of Pittsburg.

Dr. Mercer moved a resolution of thanks for the officers of the Society; which was adopted.

Dr. Ewell requested the use of centimeter A; which was granted.

The Secretary was requested to recommend to the Executive Committee a man for director of the working session.

The Society then adjourned to next year, at such place as the Executive Committee may select.

REPORT OF THE TREASURER.

RECEIPTS.

Cash on hand at opening of Rochester meeting, August 9, 1892			$178 17
" received, dues for 1890	1	$2 00	
" " " 1891	1	2 00	
" " " 1892	14	28 00	
" " " 1893	234	468 00	
" " " 1894	15	30 00	
" " adm. for 1893	26	78 00	
" " " 1894	6	18 00	
			626 00
" " sale of Proceedings			37 40
			$841 57

EXPENDITURES.

Cash paid for printing, engraving, binding, mailing, etc., volume for 1892	$499 29		
Cash paid for sundry expenses, stamps, freight, stationery, etc.	103 63	$602 92	
Cash on hand at opening of meeting at Madison, August 14, 1893		238 65	$841 57

REPORT OF SPENCER-TOLLES FUND.

Cash on hand at opening of Rochester meeting	$312 00
" received interest	18 06
Cash on hand	$330 06

We hereby certify that we have examined the foregoing account and find the same correct, with proper vouchers for expenditures.

M. D. EWELL.
EDW. BAUSCH.

AUGUST 15, 1893.

Microscopes at the Columbian Exposition.

Microscopes were to be found at the Fair in many places, and it was very easy not to find all of them. Zeiss, of Jena, had a very full line in the German exhibit, with a few lithological instruments and some slides by other makers; also Ross, Watson, Beck, and the Italian maker, Koritzka.

The Berlin University had a magnificent exhibit of scientific instruments of all kinds, including a large number of microscopes of various styles and two very large microtomes, the smaller of which, however, was equalled by the large Ryder microtome shown by the University of Pennsylvania. We did not see any important novelties; everything was what is well known and shown in the usual catalogues. Zeiss had two devices for exhibiting a number of slides, one like that of Dr. J. M. Flint, consisting of a revolving disk, and the other rather new, in which the ends of the slides were fastened on the rim of a crown-wheel, pivoted below the stage.

The American makers were not all present. Spencer & Smith, of Buffalo; Dalton, of Boston; Grunow, of New York, and Zentmayer, of Philadelphia, did not appear. The latter stated he could not obtain room. Queen & Company, of Philadelphia, were well represented in several departments; also Bausch & Lomb and the Gundlach Optical Company. We learn the latter were happy in securing two awards. It was unfortunate that so many of our principal makers were absent, as inquiries concerning them were made, in some cases of the writer. No better opportunity for advertising their wares could be found. The Academy of Sciences of Chicago maintained an alcove fitted with cases, tables, and seats where demonstrations of various kinds of microscopic work were given from day to day by different parties, among whom was Henry L. Tolman, Esq. Near by was the exhibit of measuring instruments of Prof. William A. Rogers, from the Shannon physical laboratory of Colby University, Waterville, Maine, comprising a 100-inch comparator with an attachment for transferring graduations from any line standard of length; also a circular graduating engine with magnetic clutches for the original graduation and investigation of circles two feet in diameter, a precision screw five feet in length mounted upon segmental bearings, and various standards of length.

Considerable effort was made by many exhibitors to show microscopic work by the aid of microscopes, in some cases with success, but in others the apparatus was not constructed in such a way as to bear the rather rough usage of the great crowds, and proved a failure. It was evident, however, that with some alterations adapted to prevent accidents, apparatus substantially similar to Dr. J. M. Flint's (see vol. xiii, Proc., p. 54) can be successfully employed.

It is well known to those who are familiar with the internal working of exhibitions that the awards of premiums, etc., are often made for reasons which are quite separate and distinct from the mere excellence or merit of the subject for which they are awarded; but there seems to have been much more than the usual friction and dissatisfaction at Chicago in this matter, and it is possible that such awards are not entitled always to the regard they ought to command. W. H. S.

The following letter explains itself:

CHICAGO, *October 20, 1893.*

We have made inquiries respecting the method of making the awards upon the exhibits of microscopical apparatus at the World's Columbian Exhibition and from such inquiries are convinced of the truth of the following statements, which, as a matter of right, ought to be known by working microscopists and students throughout this and other countries.

A sum of money was devoted to the compensation of the Committee on Microscopes and Objectives sufficient to secure the services of competent observers. We have been unable to obtain the names of the two members of this committee who pretended to do the work, and they are entirely unknown to the manufacturers and others of whom inquiry was made. One was said to be a civil engineer, and neither was a practical microscopist. The method of inspection adopted at one large exhibit of microscopes and objectives was simply to try the racks of the stands and inspect the brass-work generally. No tests were made of any objectives further than to screw off the front systems of some of them. We are informed that one outfit was passed upon without even taking the stand, etc., from its box.

Under these circumstances any award made is absolutely worthless and an insult to exhibitors and their customers.

M. D. EWELL.

THE RESULT OF THE CARD INQUIRY.

One hundred and fifty-three of the inquiry cards sent to members of the American Microscopical Society have been returned, with the following results. Several subjects were scored by the majority; hence the number of entries of the subjects of most interest to members greatly exceeds the number of cards:

Bacteriology, 70.
Apparatus, 62.
Medical microscopy, 61.
Histology, 59.
Plant life, 42.
Embryology, 34.
Diatomaceæ, 27.
Algæ, 22.
Infusoria, 22.
Mosses, 11.
Lithology, 5.
Rotifers, 1.
Entomology, 1.
Foraminifera, 1.
Photomicrography, 1.
Handwriting, 1.
Cytology, 1.
Micrometry, 1.
Food adulteration, 1.

Several are interested in medico-legal microscopy. Two members would prefer a single volume, and one asks if the Proceedings could not be supplied that way* if desired. A number express their approval of the publication in parts and the addition of abstracts; one wants a monthly. The following suggestions are offered:

1. That it would be better to meet with the medical or pharmaceutical associations.
2. That the fees should be increased.
3. That exchanges of slides should be published.†
4. That papers should be published on approval by the Executive Committee without reference to the annual meeting.
5. One deprecates any imitation of the Journal of the Royal Society of London, and three propose it as a model.
6. Essays are wanted on the colors of flowers and the methods of doing microscopical work in the Government departments.

It is quite probable that some of the subjects mentioned as noted by only one member would have received a larger number if they had been on the printed list, but the latter could not be unduly enlarged, and the result shows quite clearly the relative interest of members in the subjects specified.

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*In such case no part could be sent till all are published.

†Any members desiring exchanges may notify the Secretary and they will be published. One member says he has over a thousand slides of tumors.

The following letter was received shortly before this issue, and is deemed of sufficient interest to lay before our readers:

JENA, *den 7 November, 1893.*

WILLIAM H. SEAMAN, Esq.

DEAR SIR: On his return from America our Mr. Fischer has transmitted to us your wish to know the relation between the microscope-thread, as applied by us, and the actual "society screw."

As far as we can remember, this relation is as follows:

Immediately on the introduction of the society screw Mr. Carl Zeiss endeavored to get a normal of it in order to be able to copy it for his makes some time before 1872. The screw-tap which was sent him was, however, of very bad mechanical execution; the head was not cylindrical, but conical to such a degree that it could already be noticed by the naked eye. We consequently thought it best to take as normal the diameter at half height of the cone. The pitch of the thread was strictly made equal to that of the model; but, as to the profile of the thread, we believed that from constructive regards we had to take it somewhat steeper than that of the original.

Hoping these communications will be sufficient, we shall be happy to give you on desire any further information and remain, dear sir,

Yours, very truly, CARL ZEISS.